D6.4 – Initial Exploitation Plan

WP6

Lead Partner: FENIX TNT

Partner Contributors: All

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Project Acronym	EENSULATE
Project Title	Development of innovative lightweight and highly insulating energy efficient components and associated enabling materials for cost-effective retrofitting and new construction of curtain wall facades
Grant Agreement n°	723868
Funding Scheme	Innovation Action
Call	H2020- EEB-2016
Topic	EEB-01-2016 Highly efficient insulation materials with improved properties
Starting Date	1st August 2016
Duration	42 Months

Executive Summary

The present document constitutes the first version of the exploitation plan within the framework of the EENSULATE project titled: Development of innovative lightweight and highly insulating energy efficient components and associated enabling materials for cost-effective retrofitting and new construction of curtain wall façades (Project acronym: EENSULATE, Grant Agreement No. 723868).

This initial exploitation plan proceeds from the outputs of the exploitation workshop, which took place during the M12 General Assembly (GA) meeting in Genoa, Italy in October 4-5, 2017. The exploitation plan drafts the strategy and plans the concrete actions for exploitation of the project results. As well, it provides information about the particular EENSULATE project results. The document also indicates and examines project partners' exploitation claims to the exploitable results (ERs) of the EENSULATE project.

The ERs identified at the proposal stage of the project were altered, and new ERs were identified during the project development. This document presents an overview of the ERs in their current form, and it assesses the technology readiness level (TRL) estimated for each of the ERs, to provide an overview of the technology maturity. The exploitation expectations, claims and aims are defined through the BFMULO analysis, which serves as a basis for the IPR protections suggestion as well as for defining partners' individual exploitation plans. In addition, this exploitation plan offers a detailed analysis of the main risks that could affect the successful exploitation of the ERs, and that of mitigation actions identified for each risk. This risk assessment is performed through risk register tables, which were filled-in by the project partners.

As prescribed in the Grant Agreement of the EENSULATE project, exploitation workshops are organized to support exploitation of results generated within the project framework. The annual exploitation workshops are organised and let by exploitation experts from FENIX and RINA-C. The first exploitation workshop took place during the M12 General Assembly (GA) meeting in Genoa, Italy, in October 4-5, 2017. FENIX participated as an exploitation leader and RINA-C as an IPR leader organized and managed the workshop, involving all consortium partners. The aim of the workshop was to discuss the progress in the ERs development, introduce IPR issues related to exploitation, present risks management approach and to summarise preliminary market assessment. The conclusions of this workshop serve as basis for this Deliverable – all outcomes and discussed changes were taken into consideration and were implemented into this document. The report from the workshop can be found in the Annex of this Deliverable (Annex 1).

This exploitation plan was elaborated with support of all project partners and will be regularly reviewed in line with project progress and follow-up exploitation workshops.

The Deliverable is structured as follows:

- Chapter 1: Theoretical perspective on exploitation
- Chapter 2: Preliminary characterization of Exploitable Results
- Chapter 3: Partners' exploitation claims and aims
- Chapter 4: IPR management
- Chapter 5: Exploitable results TRL development
- Chapter 6: Risk assessment
- Chapter 7: Preliminary individual exploitation plans
- Chapter 8: Conclusion

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Abbreviations and Acronyms

ER Exploitable Result
IP Intellectual Property
IPR Intellectual Property Rights
NEG Non-evaporable getters
R&D Research and Development
SME Small and Medium Enterprise
TRL Technology Readiness Level
VIG Vacuum Insulated Glass

1 Exploitation and obligation to exploit

1.1 Exploitation framework and objectives

The European Union is supporting the advancement towards sustainable goals and green industry using a framework called Horizon 2020. This is a framework within which initiatives are realized through various projects. The life-cycle of a project may be divided to several steps. First, the initiative is proposed through an official proposal, then research and development take place. When the project ends, the results may be utilized in various ways which will be elaborated upon shortly. The exploitation is an end-step that is to follow the completion of the development of product, products, service or services. Exploitation Plan predicts all possible utilizations of the results of the project.

An important part of the Exploitation Plan involves the assurance of mutual benefiting to the consortium of partners with which the project was performed. It allows the partners to invest in research and contribute to their maximal potential without the risk of any damage to Intellectual Property Rights and any possible challenges, obstacles and conflicts of interest. The IPR management is crucial to reassure that such challenges are easily dealt with.

This Deliverable is meant to form the structure to explain both the importance and the content of an exploitation plan. It revolves around the EENSULATE project to assist in the utilization of the project results. It is important to use the optimal instruments to ensure order and profitability in the implementation of the desired outcomes of the project. In order to do so, an elaborated and well-structured Exploitation Plan must be performed for the EENSULATE project answering the prescribed standards of the Horizon 2020. More specifically, the objectives of the Exploitation Plan are:

- To establish and maintain mechanisms for effective exploitation;
- To inform stakeholders of the project development and encourage interactions/networking among them;
- To coordinate all levels and types of exploitation of the knowledge produced by the project;
- To ensure that there is a common understanding and agreement as well as alignment among the partners on the exploitation strategy to be followed, on a timely basis and by the most effective means.

In order to achieve the requires goals of the exploitation of the results of the project, various factors must appear within the exploitation plan. The interest of various partners of the consortium must be expressed in a format that allows consideration of all of them for the benefit of the participants of the project. The participants may come from various backgrounds such as academic, industrial, research, etc. In case of EENSULATE, the participants include research centres and groups, industrial actors, academic institutions, SMEs, and a municipality. The exploitation must relate to the expectations of all project's participants and answer the requirements of the desired outcomes. All provisions related to the management of IPR including ownership, protection and publication of knowledge, access rights to knowledge and pre-existing know-how as well as questions of confidentiality, liability and dispute settlement have been laid down in detail and agreed in the Consortium Agreement.

The Deliverable aims to prepare the ground for a proper Exploitation Plan development. At this stage of the project (M18), a first version of the Exploitation Plan will be drafted, and it will be updated along the project development until its final version (Deliverable 6.9) which is due in M42.

1.2 Partners' obligation to exploit

There are several commitments a partner that is responsible for exploitable result is obliged to follow. The key obligation is to take measures aiming to ensure exploitation of results in a period up to four years after the project ends. Each beneficiary must either directly or indirectly exploit its results by:

- Using them in further research activities (outside the EENSUALTE project);
- Developing, creating or marketing a product or process;
- Creating and providing a service, or
- Using them in standardization activities

2 EENSULATE exploitable results

In order to develop an appropriate and comprehensive Exploitation Plan, the ERs of the EENSULATE project must be identified first. Prior to the exploitation workshop (which took place in the M12 meeting), project partners were asked to update, add or erase ERs identified at the proposal stage of the project. The table below summarizes the ERs expected to be developed under the EENSULATE project. Since this Deliverable serves as the first version of the Exploitation Plan, the ERs may still change in the following versions of the Exploitation Plan. It is not exceptional to add or modify the content of the results within R&D projects.

Table 1: Overview of EENSULATE's exploitable results

N°	Exploitable result	Lead partner	Providers
1	Highly insulating environmentally friendly bi-components foam	SELENA	Surfactants+additives: EVONIK
2	Thermo-tunable coating	UCL	
3	Design manufacture and installation of high-insulation façade	FOCCHI	Glass: AGC Vig: TVITEC Sealant: SAES Getter: SAES
4	Testing protocols for durability assessment of glazed surfaces	UNIVPM	
5	Innovative sealant for vacuum insulated glass	SAES	
6	Innovative getter for vacuum insulated glass	SAES	
7	Window framing solution compatible with EENSULATE glass	BGTEC	Glass: AGC Vig: TVITEC Sealant: SAES Getter: SAES
8	EENSULATE mono-components foam for windows application	SELENA	Surfactants+additives: EVONIK

2.1 Exploitable routes for results

As exploitation states, project results can be used in further research activities other than those covered by the project, or in developing, creating and marketing a product or process, or in creating and providing a service. As a consequence, the exploitation route options can be divided into several categories, such as:

- Use for further research
- Developing and selling own products/services
- Spin-Off activities
- Cooperation agreement/Joint Ventures
- Selling IP right/Selling the (IP based) business
- Licensing IP rights (out-licensing)
- Standardisation activities (new standards/ongoing procedures)

The following table summarizes general exploitable routes for each of the EENSULATE ERs. The detailed description of the roads will be provided in the D6.9 – which is the Final Exploitation Plan and IPR strategy, once the results are fully characterized and the use is clearer and more accurately defined.

Table 2: Preliminary exploitable routes

No.	Exploitable result	Exploitable route(s)
1	Highly insulating environmentally friendly bi-components foam	Worldwide commercialization through: – Direct sale – Distributors – (Licencing)
2	Thermo-tunable coating	A product necessary for the manufacturer of the EENSULATE glass (direct sale/licensing)
3	Design manufacture and installation of high-insulation façade	This result serves as a guideline to successful manufacture and installation of the EENSUALTE façade.
4	Testing protocols for durability assessment of glazed surfaces	Testing protocols can be used for testing of the durability of glazed surfaces in other researches/projects
5	Innovative sealant for vacuum insulated glass	A product necessary for the manufacturer of the EENSULATE façade
6	Innovative getter for vacuum insulated glass	A product necessary for the manufacturer of the EENSULATE façade
7	Window framing solution compatible with EENSULATE glass	Worldwide commercialization through: – Direct sale – Distributors – (Licencing)
8	EENSULATE mono-components foam for windows application	Worldwide commercialization through: – Direct sale – Distributors – (Licencing) It is a product needed for the final application of the EENSUALTE window framing solution (façade)

2.2 Preliminary Characterization of Exploitable results

An exploitation plan must contain adequate exploitation strategy which will ensure successful implementation and the market entry of exploitable results. It is, however, crucial to know the characteristics of each of the results. Lead partners of the ERs were asked to answer questions regarding their results and these outputs were then served as a basis for the formulation of results characteristics. The questions revolved around the innovative context of the results, market environment, steps towards exploitation and commercialization of the product or services. They also tackled the IPR issues. It was done to identify what benefits will be offered to end users, how a result will impact a market, what actions will be needed to bring the product/service to the market and more (see the Characterization Table below).

Table 3: Characterization table

Characterization of ERs	
Market	Who will be the customer? What are the benefits for the customer?
	When is the expected time to market?
	What is the market size in M€ for this result and relevant trend?
	What is the approximate price range of this result / price of licences?
	Who are the competitors for this result?
	How this result will rank against competing products in terms of price/performance?
Steps towards Exploitation	When is the expected date of achievement in the project?
	Do you foresee any barriers for successful implementation?
	What are the costs to be incurred after the project and before exploitation?
	Which EENSULATE partners are involved in the results development?
Status of IPR	Have you protected, or will you protect this result? How? When?

2.2.1 Exploitable result no. 1

Exploitable result no. 1 Highly insulating environmentaly friendly bi-components foam	
Lead partner	SELENA
Description of result	EENSULATE bi-components foam will be a 2K PU system to fill the spandrel
Innovative content of result	The chemical nature of the foam is expected to improve results in technical performances, and to demonstrate an increase in the steps taken towards enhanced fire safety
Customers	Façade producers and installers
Benefits for the customer	• 50% reduction in weights • significantly improved thermal insulation • decreasing production time • Fire class: B-s1-d0
Expected date of achievement in the project	M24-M36
Expected time to market	M42
Costs to be incurred after the project	Additional investment in marketing compaign and training of sales forces
Price range	The price for the 2K foam will range between 2-4,5 euro/kg (will be accurately estimated in later stages)
Ranking against competing products in terms of price/performance?	The average estimated price is lower by 30-50% per kg. The density is about half of the actual solution, so the price is expected to stand on about half of price compared to actual solution.

Competitors	The EENSUALTE 2K foam is second to none as its characteristics are yet to be demonstarted in the market, let alone the conjoined set of qualities.
Which EENSULATE partners are involved in the development?	SELENA, EVONIK, ULSTER, FOCCHI, BGTECH
Have you protected, or will you protect this result? How? When?	In M36, SELENA will file a patent
Which could be barriers for implementation?	One of the concerns raised related to the estimation that often Façade producers do not choose to use the most advanced technology available to them, in which case the introduction of the product to the market may prove challanging. It is mentioned with the hope that the superiority of the product will assist in overcoming such challenges.

2.2.2 Exploitable result no.2

Exploitable result no. 2 Thermo-tunable coating	
Lead partner	UCL
Description of result	The result aims to become a product that will modulate the amount of infrared radiation that enters a window. The target is to reach a >20% infrared radiation modulation.
Innovative content of result	The product will be passive and will not depend on electrical or other stimuli to operate as is the case for electrochromic windows, for example. This makes its deployment more cost efficient. Retrofitting of existing window installations will also be possible.
Customers	Construction companies and architects
Benefits for the customer	The product will switch in a passive way due to the changes in local temperature. The parameters of the window (switching temperature, dimming and other) can be customized to suite a particular city or country in the world.
Expected date of achievement in the project	End of project for a lab demonstration or a more industrial scale demonstration depending on the participation of industrial partners.
Expected time to market	No accurate assessment can be provided at this point. Future reports may include this data.
Costs to be incurred after the project	This result is expected to reach TRL4, and any cost that will deliver the product to the market is almost certainly unavoidable. There is a high likelihood that such costs will exist, but this will depend on the industrial partners who will want to scale up the fabrication methods
Price range	It is undeterminable at this point
Ranking against competing products in terms of price/performance?	It is undeterminable at this point

Competitors	Electrochromic and photochromic window manufacturers
Which EENSULATE partners are involved in the development?	UCL
Have you protected, or will you protect this result? How? When?	There are yet to exist any efforts in reaching results protection. A large-scale prototype will be required first, as proof-of-concept. Due to prior publications, protection through patent is unlikely.
Which could be barriers for implementation?	Scale up is the main issue that is currently standing in the way of progress with this result. Aesthetics may be another issue and efforts have been taken, consulting various collaborators on the matter.

2.2.3 Exploitable result no. 3

<table>
<tr><th colspan="2">Exploitable result no. 3 Design manufacture and installation of high-insulation façade</th></tr>
<tr><td>Lead partner</td><td>FOCCHI</td></tr>
<tr><td>Description of result</td><td>Design manufacture, and the installation of, high performance curtain wall modules based on novel technologies, and develop an automated assembling line using foams</td></tr>
<tr><td>Innovative content of result</td><td>Synergic combination of new material innovations components aimed to bring existing curtain wall building to “nearly zero energy“ standards</td></tr>
<tr><td>Customers</td><td>Architects, Main Contractors, Real Estate Investors</td></tr>
<tr><td>Benefits for the customer</td><td>Increased thermal insulation efficiency, fire resistance, lightness, and reduced waste using injected foam during manufacture</td></tr>
<tr><td>Expected date of achievement in the project</td><td>Manufacturing of the prototype for testing – M16
Installation at demo sites – M36</td></tr>
<tr><td>Expected time to market</td><td>2020</td></tr>
<tr><td>Costs to be incurred after the project</td><td>N/A</td></tr>
<tr><td>Price range</td><td>To be defined at a later stage</td></tr>
<tr><td>Ranking against competing products in terms of price/performance ?</td><td>
<table>
<tr><th>Performance aspect</th><th>EENSULATE project target</th><th>Market reference</th></tr>
<tr><td>Thermal performance</td><td>U-value tot. = 0.4 W/m2K</td><td>U-value tot. = 1.5 W/m2K</td></tr>
<tr><td>Radiation properties</td><td>Solar Factor G = 32%</td><td>Solar Factor G = 67%</td></tr>
<tr><td>Acoustic performance</td><td>Rw = up to 52 db</td><td>Rw = 30 ÷ 40 db</td></tr>
<tr><td>Light transmittance</td><td>0.60</td><td>0.40 ÷ 80</td></tr>
</table>
</td></tr>
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Competitors	Major Curtain Wall companies (Permastelisa, Lindner, etc.)
Which EENSULATE partners are involved in the development?	FOCCHI, RINA C, AGC, SAES, SELENA, UCL, EVONIK, ULSTER, TVITEC, UNSTUDIO, UNIVPM
Have you protected, or will you protect this result? How? When?	The aim is to protect the knowledge regarding the design. No steps in the direction were taken yet, but in the future there is an estimation of a proper result protection.
Which could be barriers for implementation?	No barriers are foreseen at this stage. If any shall arise in the future stages, the information will be communicated through future reports.

2.2.4 Exploitable result no. 4

Exploitable result no. 4 Testing protocols for durability assessment of glazed surfaces	
Lead partner	UNIVPM
Description of result	New testing procedures and measurement protocols will be developed, aiming at fully characterizing new glasses performances like solar reflectance durability in terms of UV, humidity temperature and soiling. Emphasis will be given to aging testing protocols for thermotunable glass coatings in which specific procedures have not been yet standardized.
Innovative content of result	The main innovation achieved by the testing protocols is that the accelerated weathering tests allow to assess: 1. The soiling effect on the glazed surfaces 2. The durability of the thermotunable performance of the glass coating.
Customers	Glass manufacturers and Building constructors
Benefits for the customer	1. Increased know-how on advanced building materials and their characterization. 2. Definition of a methodology to calibrate thermo-tunable glass coating thickness with climate and comfort conditions.
Expected date of achievement in the project	M36
Expected time to market	1 year after project conclusion
Costs to be incurred after the project	• Cost to perform a pre-normative analysis of the testing procedures and measurement protocols • Cost for an interlaboratory study of testing procedures and round robin test to establish the precision and

	reproducibility of the measurement protocol.
Price range	The price range of these results will be linked to typical engineering consultancy activities. Scientific Paper will be offered free of charge. Access to standards will be provided free of charge only to the owners of other core results. Copies of the standards will be sold to customers, at a price yet to be accurately estimated.
Ranking against competing products in terms of price/performance?	Most of the existing testing procedures for glass performances evaluation do not concern the durability of the coating in relation to its thermotunable properties. New protocols will be focused on the reflective-transmittance properties of thermotunable coating.
Competitors	Main competitors are other research institutes and consultancy agencies working on the field of glass performance and building efficiency.
Which EENSULATE partners are involved in the development?	UNIVPM, UCL, ULSTER
Have you protected, or will you protect this result? How? When?	New testing guidelines will be kept confidential and restricted to the project partners. UNVIPM will evaluate the opportunity to license some of the testing protocols.
Which could be barriers for implementation?	There are no significant barriers against the results implementation.

2.2.5 Exploitable result no. 5

Exploitable result no. 5 Innovative sealant for vacuum insulated glass	
Lead partner	SAES
Description of result	It is a polymer-based low processing temperature (below 200 °C) sealing material.
Innovative content of result	Despite its polymer nature, it will provide high permeation barrier performances and, together with the pumping action of a proper getter solution, will maintain the pressure inside the evacuated chamber below 0.1 Pa, thus providing the optimum VIG thermal insulation characteristics.
Customers	The VIGs makers
Benefits for the customer	Compared to current sealing solutions based on glassfrit, its lower processing temperature allows for the use of a high performance low-emissive coating. Furthermore, it is less rigid, thus reducing possible VIG bending due to expected large temperature difference between the two glass panes (inside-outside)
Expected date of achievement in the project	M21

Expected time to market	Together with the EENSULATE VIGs market entry.
Costs to be incurred after the project	There are aditional expected costs as the SAES will need to set-up a new dedicated production line for the innovative getter (up to 70 ton per year)
Price range	It is hard to estimate it at this stage of the project. Grossly it is possible to estimate a price of the sealant in the range between 6 to 36 € for a 2.5 m by 1.5 m VIG
Ranking against competing products in terms of price/performance?	Glassfrit is cheaper but current VIGs on the market based on glassfrit sealant have lower performances compared to the foreseen EENSULATE ones
Competitors	Several glassfrit producers
Which EENSULATE partners are involved in the development?	Mainly SAES for the development of the sealant. Other partners are involved in the definition of the VIG (and consequently of the sealant) specification (mainly RINA, TVITEC, ULSTER and FOCCHI)
Have you protected, or will you protect this result? How? When?	SAES will evaluate the possibility to protect the results with a patent application as soon as the results will meet the requirements.
Which could be barriers for implementation?	VIGs have been around for 30 years and still are not in the mainstream for several reasons. Among which are the costs, the still limited performance, and some additional constraints. Some of the barriers are expected to prove challenges in later stages despite the technical success of the EENSULATE project.

2.2.6 Exploitable result no. 6

Exploitable result no. 6 Innovative getter for vacuum insulated glass	
Lead partner	SAES
Description of result	It is a peripheral distributed getter
Innovative content of result	It is dispensable or distributed and with high capacity
Customers	The VIGs makers
Benefits for the customer	Current getters for VIG are traditional discrete NEG (non evaporable getters) pills and are thick, visible, typically located in a corner, requiring high temperature activation (400 °C) and with limited sorption capacity. This result, being distributed, will minimize pressure gradients along the VIG and will be invisible. Another advantage is that it will not require glass panel machining to host a thick NEG. Furthermore, it will have higher sorption capacity.
Expected date of achievement in the project	M28
Expected time to market	Together with the EENSULATE VIGs market entry.
Costs to be incurred after the	There are aditional expected costs as the SAES will need to set-up a

project	new dedicated production line for the innovative getter (up to 35 ton per year)
Price range	It is hard to estimate it at this stage of the project. It is possible to grossly estimate a price of the sealant to range between 3 and 18 € for a 2.5 by 1.5 m VIG.
Ranking against competing products in terms of price/performance?	NEG pills are cheaper but bulky, requiring high temperature activation and with lower gas sorption capacity.
Competitors	Several Chinese NEG producers (direct SAES competitors on NEG)
Which EENSULATE partners are involved in the development?	SAES
Have you protected, or will you protect this result? How? When?	SAES will evaluate the possibility to protect the results with a patent application as soon as the results will meet the requirements.
Which could be barriers for implementation?	VIGs have been around for 30 years and still are not in the mainstream for several reasons. Among which are the costs, the still limited performance, and some additional constraints. Some of the barriers are expected to prove challenges in later stages despite the technical success of the EENSULATE project.

2.2.7 Exploitable result no.7

Exploitable result no. 7 Window framing solution compatible with ENSULATE glass	
Lead partner	BGTEC
Description of result	Window framing solution compatible with EENSULATE glass and EENSULATE foam
Innovative content of result	Frames adjusted to use lightweight thin double pane vacuum glass in the window solutions
Customers	Building owners, residents, occupants
Benefits for the customer	• Significant improvement in window thermal performance • Lighter solution
Expected date of achievement in the project	M28
Expected time to market	After the end of the project
Costs to be incurred after the project	• Marketing costs • Costs related with adjustment of production line to the new product • Technicians training • Involvement of more people into production line
Price range	Window similar to standard solution + Price of innovative glazing.

	Accurate estimation is to be specified in a later stage.
Ranking against competing products in terms of price/performance?	• Significant improvement of the thermal performance • lighter solution
Competitors	Window producers
Which EENSULATE partners are involved in the development?	BGTEC, FOCCHI
Have you protected, or will you protect this result? How? When?	To be defined. No measurements were taken yet.
Which could be barriers for implementation?	The price might prove a barrier in a later stage, as well as several expected aesthetic barriers.

2.2.8 Exploitable result no. 8

Exploitable result no. 8 EENSULATE mono-components foam for windows application	
Lead partner	SELENA
Description of result	EENSULATE mono-components foam for windows will used in finishing works and to seal windows and doors
Innovative content of result	The chemical nature of the foam will lead to improved results in technical performances increasing the fire safety
Customers	Façade producer and installers
Benefits for the customer	Reduced density, better thermal insulation, improving significantly fire properties without using harmful components.
Expected date of achievement in the project	Between M24-M36
Expected time to market	M42
Costs to be incurred after the project	It is expected at this point that no additional costs are planned to exist. The company is going to use its standard channels, especially the B to B channels, to reach professional users.
Price range	1K foam will range between 3-10 euro per can (depends on the size)
Ranking against competing products in terms of price/performance?	Decrease of 20 % of the density, increase of at least 25% the thermal insulation properties.
Competitors	Soudal, Dan Braven, Henkel
Which EENSULATE partners are involved in the development?	SELENA, EVONIK, FOCCHI, BGTech
Have you protected, or will you protect this result? How? When?	A patent request will be filed during M36 alongside other patents requests in the project.
Which could be barriers for implementation?	No additional barriers are expected to occure at this stage.

3 Partners' exploitation expectations and claims

This chapter aims to identify the exploitation intentions of the consortium partners. It is done through the BFMULO analysis. The analysis is applied to evaluate the involvement of each project partner in all identified ERs of the EENSULATE project. These findings further serve as a basis for both the IPR management and partners' individual exploitation plans.

3.1 BFMULO analysis

In order to develop adequate exploitation plan and strategy, it is necessary to determine involvement of project partners in each of the ERs. The BFMULO matrixes have been created for all ERs and partners were asked to fill them in according to their exploitable intentions. Partners indicate their intentions through writing letters B, F, M, U, L, and O. Partners are aware that they might choose more than one letter (or none) to each of the results. The letters stand for:

- **B** = IPR's on background information, information, excluding foreground information, brought to the project from existing knowledge, owned or controlled by project partners in the same or related fields of the work carried out in the research project.

- **F** = IPR's on foreground information, Information including all kind of exploitable results generated by the project partners or 3rd parties working for them in the implementation of the research project. To have an F in an exploitable result it is necessary that a partner has a task(s) in the project related to that very result.

- **M** = Making the products, manufacturing and selling or directly implementing it through own facilities and skills.

- **U** = Using the result, implemented with own knowledge to develop new ranges of products or newer processing. Furthermore, the direct or indirect utilization of foreground in further research activities other than those covered by the project, or for developing, creating and marketing a product or process, or for creating and providing a service.

- **L** = Licensing the result, therefore earning from a negotiation towards third parties outside the Consortium.

- **O** = Other, any other exploitation means (e.g.: consultancy, provide services, etc).

This analysis has been performed for each of the EENSULATE's ERs during the exploitation workshop which took place in M12. Partners were asked to indicate their involvement in each of the ERs and the following matrix summarizes partners' exploitable intentions, expectations, and claims.

Table 4: BFMULO matrix of the EENSULATE ERs

Partner	ER1	ER2	ER3	ER4	ER5	ER6	ER7	ER8
RINA	-	U,O	B,F,U,O	-	-	-	B,F,U,O	-
AGC	-	-	-	-	-	-	-	-
SAES	-	-	-	-	B,F,M,U	B,F,M,U	-	-
SELENA	FMUL	-	-	-	-	-	-	FMUL
UCL	-	BFM	-	-	-	-	-	-
TVITEC	-	U	B,F,M,U	U	U	U	B,F,M,U	-
FOCCHI	F,U	U	B, F, M,U	U	U	U	B,F,M,U	-
UNSTUDIO	F,U	U	B,F,U	-	U	U	B,F,U	-
FENIX	O	-	-	-	-	-	-	-
BGTEC	U	U	F,U	-	-	-	B,F,M,U	-
UNIVPM	-	O	O	BFMUO	-	-	-	-
GMD	-	-	O	-	-	-	O	-
ULSTER	-	-	-	-	-	-	-	-
EVONIK	BMU	-	-	-	-	-	-	BMU

4 IPR management

Effective exploitation of the Exploitable results depends, among others, on the proper management of intellectual property, which should be part of the overall management of knowledge in the project.

During the entire project, specific actions have been and will be undertaken for properly addressing the issues related to the intellectual property rights, such as pre-existing knowledge of the project partners, an assessment of the results generated during the project, proposition of the optimal IPR protection options, ownership and proper implementation of IPR protection measures.

The framework of the IPR management is set out within the Grant Agreement and Consortium Agreement, which stipulates the rules related to the following IP issues:

- Identification of the pre-existing knowledge (Background) and the specific limitations and conditions for its implementation;
- Ownership of the Results;
- Transfer of the Results;
- Access rights to the Background and the Results;
- Non-disclosure of the information.

The detailed overview of the main provisions related to intellectual property rights, use and dissemination of the results generated by the EENSULATE project will be provided in the Deliverable D6.5 – *IPR Manual.*

4.1 Introduction to IPR

Intellectual property refers to "*creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce*"[1].

Intellectual Property Rights are private legal rights that protect the intangible assets and give the owner a legal advantage. They are commonly divided into two categories, those are: **Industrial Property Rights** (e.g. patents, trademarks, industrial designs, geographical indications) and **Copyright and Related rights** (e.g. rights of the authors/creators and those of performing artists in their performances, producers of phonograms in their recordings, and those of broadcasters in their radio and television programmes).

However, the protection of IPR can be secured also by the commercial strategies implemented within the business. The brief overview of the measures which can be considered in order to protect intellectual property related to the exploitable results generated within the EENSULATE project are provided in the table below.

Industrial Property Rights	
Patent	Patent is an exclusive industrial right granted for protection of inventions, both products and processes, that offer a new technical solution or provide a new way of doing something. A patent is a territorial right and has its effects within the national boundaries of the country for which it was granted.

[1] http://www.wipo.int/about-ip/en/

	In order to qualify for patent rights, the invention: • must belong to any field of technology; • must show a new characteristic which is not known in the existing knowledge in its technical field; • should include an inventive step which means that the proposed improvement should not be obvious to someone skilled in the technical area or deduced by a person with average knowledge of the technical field; • must be capable of industrial application.
Utility model	Utility model protects technical solutions like the invention with the fact that there is sufficient low level of inventiveness. This kind of IPR protection is particularly suited for SMEs that make "minor" improvements to, and adaptations of, existing products. Protection of utility model is provided in small but significant amount of countries and regions and can be also known as “petty patents” or “innovation patents”.
Industrial Design	Industrial design refers to the ornamental or aesthetic aspect of a product. An industrial design may consist of the creation of a line, contours, shape, materials, configuration or composition of pattern or colour, or combination of pattern and colour containing aesthetic value. A design can be a two-or three-dimensional shape used to produce a product, industrial commodity or handicraft. In order to be protectable, an industrial design: • must be new; • must have individual character (the overall impression which that design produces to the informed user must be different from that produced by earlier designs taken individually).
Trademark	Trademarks are used to distinguish the goods and services of one company from those of others. Trademark can protect a company’s brand from consumer confusion and sales losses. Signs, words, in some cases personal names, designs, letters, numerals, shape of the goods or their packaging etc. may be used as trademark.
Artistic work protected by copyright	
Copyright	Scientific and literary works and works of fine arts; such as software, original literary and artistic works, architectural designs, databases, advertising creations, musical works, cinema, graphics, choreographic works, paintings and sculptures are covered under copyright. Such works are, as a rule, protected throughout the life of the author and for 70 years from his death. In order to distribute intellectual and artistic works by means of sales, rent, import, export, representation, making available to public via the internet or any other form; it is necessary to obtain written permission from the copyright holder. Works protected by copyright can also be protected by industrial property (such as trademark or design) on condition that they meet the criteria for relevant type

	of industrial property.
Commercial strategies	
Trade secret	Trade secrets are special competitive information that companies have and have to be kept confidential. Therefore, these types of information are not registered. Trade secrets can be the most precious intellectual asset of the company. Client records, in-company training notes, R&D records, laboratory memos, presentations etc. may be some forms of trade secrets.

4.2 Partners' Rights and Obligations

By taking a part in the project the partners committed to certain rights and obligations stipulated by the Grant Agreement and the Consortium Agreement.

4.2.1 Access rights

Based on the Grant Agreement and Consortium Agreement the access rights mean rights to use results or background under terms and conditions laid down in the Grant Agreement and in accordance with the Horizon 2020 Rules for Participation. As the project is based on collaboration between several partners, each project partner has the right to request access rights to the other partner's background and results as long as it needs them in order to carry out its work under the project or to use its own results.

Table 5: Overview of the general conditions concerning the granting of the access rights

Subject	Purpose	Granting access rights
Other partners	Implementation of project	Royalty-free
	Exploitation of Partner's own results	Fair and reasonable conditions
	Exploitation of results for internal research activities	Royalty-free
Affiliated entities[2]	Exploitation of results generated by partners to which they are affiliated	Fair and reasonable conditions

The above-mentioned rules shall apply unless stated otherwise.

The identification of the background related to the EENSULATE project is stipulated in the attachment 1 of the Consortium Agreement. Project partners hereby agreed on the background of the project and acknowledged each other also about specific background which access is subject to legal restrictions or limits. Anything not identified in the Consortium Agreement shall not be object of Access Right obligations regarding background.

[2] Affiliated entity refers to any legal entity that is under the direct or indirect control of a participant, or under the same direct or indirect control as the participant, or is directly or indirectly controlling the participant.

4.2.2 Results and ownership

In accordance with the Horizon 2020 Rules for Participation and the Grant Agreement, project results belong to the partner generating them. Given the collaborative nature of the project, there may arise a situation when several partners have jointly carried out work generating results and their respective share of the work cannot be ascertained. In case that such a situation occurs, the affected partners shall (if needed) conclude a separate joint ownership agreement stipulating the allocation of rights and terms of exercising their ownership.

4.2.3 Obligation to protect the results

Each project partner must examine the possibility of protecting its results and must adequately protect them — for an appropriate period and with appropriate territorial coverage — if the results can reasonably be expected to be commercially or industrially exploited and protecting them is possible, reasonable and justified (given the circumstances).

When deciding on protection, the partner must consider next to its own legitimate interests also the legitimate interests (especially commercial) of the other partners.

4.2.4 Obligation to exploit results

Each partner must — up to four years after the end of the project— take measures aiming to ensure exploitation of its results (either directly or indirectly, in particular through transfer or licensing) under terms and conditions set up in the Grant Agreement.

4.2.5 Obligation to ensure open access to the results

Each project partner must ensure open access (free of charge online access for any user) to all peer-reviewed scientific publications relating to its results under terms and conditions set up in the Grant Agreement.

4.2.6 Consequences of non-compliance

In case that any of the above-mentioned obligations has been breached, the Commission may reduce the maximum grant amount proportionally to the seriousness of the breach.

4.2.7 Non-disclosure of information

All information in whatever form or mode of communication, which is disclosed by the project partner (the "Disclosing Party") to any other partner (the "Recipient") in connection with the project during its implementation and which has been explicitly marked as "confidential" at the time of disclosure, or when disclosed orally has been identified as confidential at the time of disclosure and has been confirmed and designated in writing within 30 calendar days from oral disclosure at the latest as confidential information by the Disclosing Party, is "Confidential Information". The Recipient is obliged not to use the Confidential Information otherwise than for the purpose for which it was disclosed for a period of 5 years after the end of the project.

Further terms and conditions related to the Confidential Information are provided under Section 10 in the Consortium Agreement.

4.3 Proposition of IPR protection options

Preliminary proposals of the IPR protection measures related to the Exploitable results have been considered. The results are presented in the table below. IP proposals are subjected to the potential modifications of the Exploitable results that may arise during the project. Therefore, the updated IP proposals might be provided by the upcoming exploitation plans. Final proposals and the overview of the taken measures will be provided at the end of the project.

Table 6: Proposed IPR protection for EENSULATE exploitable results

No.	Exploitable result	Proposed IPR protection
1	Highly insulating environmentally friendly bi-components foam	Patent
2	Thermo-tunable coating	Patent
3	Design manufacture and installation of high-insulation façade	Patent
4	Testing protocols for durability assessment of glazed surfaces	Copyright
5	Innovative sealant for vacuum insulated glass	Patent
6	Innovative getter for vacuum insulated glass	Patent
7	Window framing solution compatible with EENSULATE glass	Patent
8	EENSULATE mono-components foam for window application	Patent

Protection of the intellectual property rights generated within EENSULATE Project can be ensured also by commercial strategies implemented by project partners, such as confidentiality implied for confidential business information, trade secrets and know how.

5 Technology Readiness Level Development

The **TRL** scale is a metric for describing the maturity of a technology. The acronym stands for **T**echnology **R**eadiness **L**evel. The scale consists of 9 levels. Each level characterises the progress in the development of a technology, from the idea (level 1) to the full deployment of the product in the marketplace (level 9). The scale is in detailed described below.

Table 7: Technology Readiness Level scale

Level 1	*Basic Research: basic principles are observed and reported*	Lowest level of technology readiness. Scientific research begins to be translated into applied research and development. Examples might include fundamental investigations and paper studies
Level 2	*Applied Research: technology concept and/or application formulated*	Once basic principles are observed, practical applications can be formulated. Examples are limited to analytic studies and experimentation.
Level 3	*Critical function, proof of concept established*	Active research and development is initiated. Laboratory studies aim to validate analytical predictions of separate components of the technology. Examples include components that are not yet integrated or representative.
Level 4	*Laboratory testing of prototype component or process*	Design, development and lab testing of technological components are performed. Here, basic technological components are integrated to establish that they will work together. This is a relatively “low fidelity” prototype in comparison with the eventual system.
Level 5	*Laboratory testing of integrated system*	The basic technological components are integrated together with realistic supporting elements to be tested in a simulated environment. This is a “high fidelity” prototype compared to the eventual system.
Level 6	*Prototype system verified*	The prototype, which is well beyond that of level 5, is tested in a relevant environment. The system or process demonstration is carried out in an operational environment.
Level 7	*Integrated pilot system demonstrated*	Prototype is near, or at, planned operational system level. The final design is virtually complete. The goal of this stage is to remove engineering and manufacturing risk.
Level 8	*System incorporated in commercial design*	Technology has been proven to work in its final form under the expected conditions. In most of the cases, this level represents the end of true system development.
Level 9	*System ready for full scale deployment*	Here, the technology in its final form is ready for commercial deployment.
Beyond 9	*Market introduction*	The product, process or service is launched commercially, marketed to and adopted by a group of customers (including public authorities).

The following table summarizes the TRL development for each of the EENSULATE ERs.

Table 8: TRL of EENSULATE ERs

No.	Exploitable results	Lead partner	From TRL	To TRL
1	Highly insulating environmentally friendly bi-components foam	SELENA	4	7
2	Thermo-tunable coating	UCL	1	4
3	Design manufacture and installation of high-insulation façade	FOCCHI	4	7
4	Testing protocols for durability assessment of glazed surfaces	UNIVPM	3	6
5	Innovative sealant for vacuum insulated glass	SAES	3	7
6	Innovative getter for vacuum insulated glass	SAES	3	7
7	Window framing solution compatible with EENSULATE glass	BGTEC	4	7
8	EENSULATE mono-components foam for window application	SELENA	4	7

6 Risk assessment

A risk is any area of uncertainty that represents a possible threat to the project. To manage and mitigate risks, there is a need to identify them first, then assess the likelihood of their occurrence and finally estimate the impact they might have on the project. Actions should be taken to avoid or reduce the likelihood of events that might endanger the exploitation of the project results. The identification and consideration of risks and their prevention is an integral part of project management.

The project consortium must be aware that certain degree of risk-taking is inevitable for the project to achieve its objectives. Decisions in the project will be taken based on evidence and reasonable assumptions, but outcomes are never fully predictable. Some variables related to possible risks may be hidden at certain stages of the project, and possibly revealed in other. It will be the role of the project management to manage the exposure of the project results to risks by driving actions to improve control of uncertainty and take steps to reduce the chance of failing to achieve the stated objectives. Regular review of exposure to risks are normally conducted to design the steps that are taken in managing them. Exploitation leaders will supervise that all project partners are actively engaged in the risk management process to ensure that risks are identified by members of the project and that emerging risks are escalated upwards.

6.1 Risk management process

- ***Risk identification*** – risks should be directly related to the project objectives and agreed by the whole project consortium. Risk management means identifying and managing uncertainties to delivery of objectives, not managing issues that might be constant. Focus on issues alone can lead to fire fighting.
- ***Risk evaluation*** **–** Risk evaluation is the evaluation of the impact of each risk should it occur. It aims to answer questions such as: What impact might certain risks have on benefits, time, cost, quality, reputation, people, etc. How likely is it that these risks will occur? The probability and impact can both be scored, e.g. using a High/Medium/Low scale.
- ***Risk prioritisation*** **–** It is crucial to estimate what is the priority of each risk. Identifying the urgency and importance of a risk is not the same thing – It is important to deal with the urgent risks quickly, and with the important risks comprehensively.
- ***Risk management planning*** **-** a strategy for mitigating the risks identified and preventing the project from being derailed. What actions and resources will be needed to reduce the impact and/or probability of the risk happening? The planning should consider:
    - How to prevent it from happening - either by putting some counter-measures in place or putting the project in a position where it would have no impact
    - How to reduce the risk - what action is needed to reduce the probability of the risk happening and/or to reduce the impact in case it is realized.
    - Can you transfer the risk to a third party (e.g. take out insurance) or share it in some way (shared risk-shared gain)?
    - What to do to if the risk does occur - do you need a contingency plan?
    - What are the implications of accepting the risk - ensuring that all the stakeholders are aware of the possible consequences?
- ***Risk monitoring*** **-** the project's overall exposure to risk must be reviewed throughout the life of a project and where necessary actions to mitigate risks must be taken. Revisions to the project business case or assumptions must be considered, if circumstances alter.

6.1.1 Risk identification

There are various risks that could affect the success of the project results. They can be categorized in the following main different categories:

- Technological Risks
- Partnership Risks
- Market Risks
- IPR/Legal Risks
- Management and Financial Risks
- Environmental, Regulation, Safety and Other Risks

Technological risk - The technological risk is considered as a combination of technology and technical risks. Technology risk is concerning an underpinning technology necessary for a project. Technical risk is related to system/technology implementing and integration.

Partnership risks are the risks deriving from the other partners involved in the project.

Market risk – It is defined as the risk of economic losses resulting from price changes in the capital markets. This includes equity risk, general and specific interest-rate risk, property risk and currency risk. Other sources of market risk include recessions, political turmoil, changes in interest rates and terrorist attacks. Systematic (market risk) – cannot by eliminated, unsystematic (specific risk) – can be reduced to some extend thorough diversification.

IPR/Legal risk – various legal issues related to the violation of laws and/or standards and/or regulations. Or, related to the IPR (the legal costs of protecting, enforcing of IPR, defending of IP from infringement etc.).

Management and Financial risk – management risk can be defined as the risks associated with ineffective, destructive or underperforming project management. Financial risk is concerned with various financial inconsistencies, insufficiency or ineffective financial management within a project.

Environmental, Regulation, Safety and Other Risks- regulations of health, safety or environment can pose various risks for the project results exploitations.

6.1.2 Risk evaluation

Risks are evaluated based on Risk Assessment Tool described below. The risk assessment tool acts as a guide to determine an appropriate risk rating for each risk.

Table 9: Impact assignment

Consequences (impact)	Assignment	Note
1	Insignificant	Minor problems easily handled by normal day to day processes.
2	Minor	Some disruption or modification of correct execution possible.
3	Moderate	Moderate modification on the correct execution and results.
4	Major	Results severely affected.
5	Catastrophic	Results are under crucial risk not to execute or of heavy delay.

Table 10: Likelihood assignment

Likelihood	Description
1	Rare
2	Unlikely
3	Moderate
4	Likely
5	Almost certain

Table 11: Risk assessment matrix

Likelihood	Impact				
	Insignificant	Minor	Moderate	Major	Catastrophic
Rare	Low	Low	Low	Low	Moderate
Unlikely	Low	Low	Moderate	Moderate	High
Moderate	Low	Moderate	Moderate	High	Very high
Likely	Low	Moderate	High	Very high	Unacceptable
Certain	Moderate	High	Very high	Unacceptable	Unacceptable

A Risk Register table was designed to act as a repository for all risks identified and includes additional information about each risk, e.g. category and brief description of the risk, impact and likelihood assessed by values, mitigation steps etc. As a result of the first exploitation workshop, a structure of Risk Register table was established, and its content will be regularly reviewed throughout the life of the project.

Table 12: Risk Register table template

ID	Risk identification	Likelihood		Impact		Grade	Risk Map	Mitigation	
		Value	Score	Value	Score			Description	Success rate
1	Technological risks								
1.1	Worthless result: ill-timed disclosure		0		0	0	Low		
1.2	Worthless result: earlier patent exists		0		0	0	Low		
1.3	Worthless result: better technology/methodology exists		0		0	0	Low		
1.4	Significant dependency on other technologies		0		0	0	Low		
1.5	The life cycle of the new technology is too short		0		0	0	Low		
1.6	Result aiming at replacing existing and well entrenched technologies		0		0	0	Low		
2	Partnership risks								
2.1	Disagreement on further investments: some partners may leave		0		0	0	Low		
2.2	Industrialization at risk: no manufaturer for the result		0		0	0	Low		
2.3	Industrialization at risk: an industrial parnter leaves the market		0		0	0	Low		
2.4	Industrialization at risk: a partner declares bunkruptcy		0		0	0	Low		
2.5	Disagreement on ownership rules		0		0	0	Low		
2.6	Partners on the same market		0		0	0	Low		
3	Market risks								
3.1	Exploitation disagreement: partners on the same market		0		0	0	Low		
3.2	Exploitation disagreement: partners with divergent interests		0		0	0	Low		
3.3	Worthless result: performance lower than market needs		0		0	0	Low		
3.4	Nobody buys the product. Nobody needs it		0		0	0	Low		
3.5	Nobody buys the product. Too expensive		0		0	0	Low		
3.6	Nobody buys the product. Unsuitable sales force		0		0	0	Low		
3.7	Nobody buys the product. The project hits against a monopoly		0		0	0	Low		
3.8	Nobody buys the product. Problems at the time of the first sales		0		0	0	Low		
3.9	Nobody buys the product. Rejected by end-users		0		0	0	Low		
4	IPR/Legal risks								
4.1	Legal problems: proceeding against Consortium		0		0	0	Low		
4.2	Legal problems: we are sued for patent infringement		0		0	0	Low		
4.3	Know- how risks: it is easy to counterfeit the patent		0		0	0	Low		
4.4	Know- how risks: a counterfeit cannot be proved		0		0	0	Low		
4.5	Know- how risks: the patent application is rejected		0		0	0	Low		
5	Management and Financial								
5.1	Nobody buys: Our licensee is not exploiting his exclusive license		0		0	0	Low		
5.2	Know- how risks: there are leaks of confidential information		0		0	0	Low		
5.3	Multiple change to original objectives		0		0	0	Low		
5.4	Lack of awareness of risk management		0		0	0	Low		
5.5	Inadequate communication among partners		0		0	0	Low		
5.6	Inadequate reporting procedures		0		0	0	Low		
5.7	Off time supply of financial means		0		0	0	Low		
5.8	Weak exploitation. Inadequate business plan		0		0	0	Low		
6									
6.1	Nobody buys the product. Does not comply with the standards		0		0	0	Low		
6.2	Nobody buys: Standards to make it compulsory don't yet exist		0		0	0	Low		
6.3	Research is socially or ethically unacceptable		0		0	0	Low		
6.4	Influence of laws and regulations		0		0	0	Low		

The instrument for the identification of the most dangerous risks that may hinder the development and exploitation of the settled project results is the so-called Priority Map. The Priority Map's strength lies in its capacity to summarize in a figure the main exploitation related activities risks connected to the project and to give an overall idea of the balance between opportunities and risks related to the result, thus helping the involved partners to make an evaluation of the state of the art and intervention needed for efficient exploitation. As highlighted in the following picture, the Priority Map is divided in 4 quadrants.

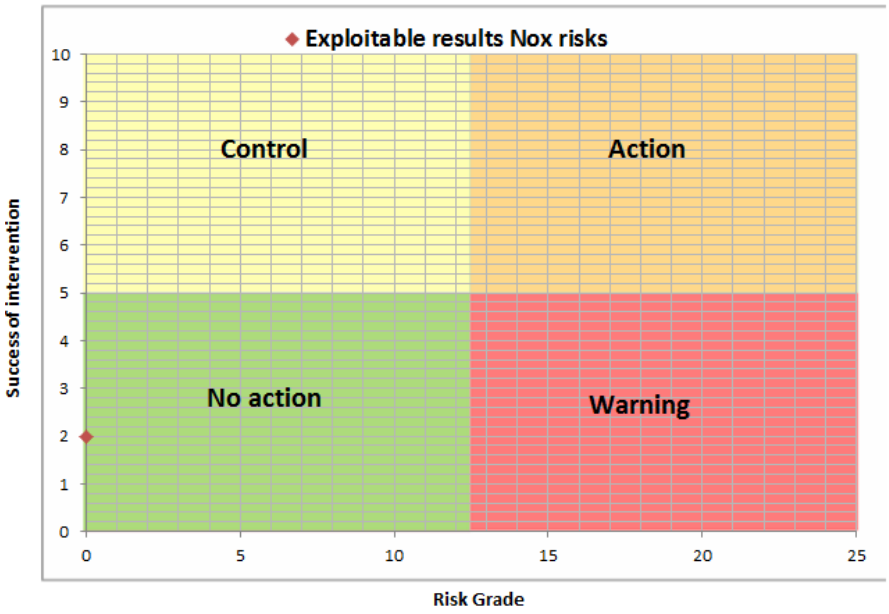

Figure 1: Priority map template for project exploitable results risks

6.2 Risk assessment of the EENSULATE project

Before and during the exploitation workshop, partners were encouraged to assess previously identified risks. As this exercise was mainly meant to make partners familiar with the risk assessment methodology, the risks assessment was performed for the EENSULATE project in general. Therefore, the risk assessment was not yet performed for individual exploitable results. The next version of the Exploitation Plan will aim to assess risks in all exploitable results identified within the project. The following table illustrates risks evaluation completed by project partners. The inputs from partners were collected and the average grade was given.

Table 13: Risk assessment of the EENSULATE project

ID	Risk identification	Likelihood		Impact		Grade	Risk Map	Mitigation	
		Value	Score	Value	Score			Description	Success rate
1	Technological risks								
1,1	Worthless result: ill-timed disclosure	Unlikely	2	Moderate	3	6	Moderate	Perform a market analysis, communicate with customers beforehand	7
1,2	Worthless result: earlier patent exists	Unlikely	2	Major	4	8	Moderate	Existing patents research	7
1,3	Worthless result: better technology/methodology exists	Unlikely	2	Major	4	8	Moderate	Continue to develop the product until it matches market standards	8
1,4	Significant dependency on other technologies	Rare	1	Moderate	3	3	Low	Market the product individually	8
1,5	The life cycle of the new technology is too short	Moderate	3	Major	4	12	High	Future proofing	8
1,6	Result aiming at replacing existing and well entrenched technologies	Moderate	3	Major	4	12	High	Need to clarify exact added value and real competitors	5
2	Partnership risks								
2,1	Disagreement on further investments: some partners may leave	Moderate	3	Moderate	3	9	Moderate	Discuss exploitation throughout the project, have backup contacts for future cooperation	7
2,2	Industrialization at risk: no manufaturer for the result	Moderate	3	Moderate	3	9	Moderate	Create backup contacts for future cooperation	8
2,3	Industrialization at risk: an industrial partner leaves the market	Moderate	3	Major	4	12	High	Relevant competence knowledge to be shared within the consortium.	5
2,4	Industrialization at risk: a partner declares bunkruptcy	Unlikely	2	Major	4	8	Moderate	Create backup contacts for future cooperation	8
2,5	Disagreement on ownership rules	Unlikely	2	Minor	2	4	Low	Make ownership intentions clear early on in the project	8
2,6	Partners on the same market	Unlikely	2	Minor	2	4	Low	Discuss the marketability during the project with other partners	7
3	Market risks								
3,1	Exploitation disagreement: partners on the same market	Moderate	3	Major	4	12	High	The result will be protected by patent	5
3,2	Exploitation disagreement: partners with divergent interests	Rare	1	Moderate	3	3	Low	Make ownership intentions clear early on in the project	7
3,3	Worthless result: performance lower than market needs	Moderate	3	Major	4	12	High	Determine level of market need (taking into account cost)	5
3,4	Nobody buys the product. Nobody needs it	Unlikely	2	Major	4	8	Moderate	Market assessment, market research together with future customers	7
3,5	Nobody buys the product. Too expensive	Moderate	3	Major	4	12	High	Value analysis to reduce cost. Balance performance to cost	5
3,6	Nobody buys the product. Unsuitable sales force	Unlikely	2	Moderate	3	6	Moderate	Develop training methodology	6
3,7	Nobody buys the product. The project hits against a monopoly	Moderate	3	Major	4	12	High	Market research	7
3,8	Nobody buys the product. Problems at the time of the first sales	Likely	4	Moderate	3	12	High	Create clear and well-defined business strategy and market entry plan	8
3,9	Nobody buys the product. Rejected by end-users	Unlikely	2	Moderate	3	6	Moderate	Market assessment, market research together with future customers	7
4	IPR/Legal risks								
4,1	Legal problems: proceeding against Consortium	Unlikely	2	Moderate	3	6	Moderate	Provide evidences that the research was independent	7
4,2	Legal problems: we are sued for patent infringement	Unlikely	2	Major	4	8	Moderate	Provide evidences that the research was independent	8
4,3	Know- how risks: it is easy to counterfeit the patent	Unlikely	2	Moderate	3	6	Moderate	Apply for IP protection	5
4,4	Know- how risks: a counterfeit cannot be proved	Unlikely	2	Moderate	3	6	Moderate	Keep development processes	5
4,5	Know- how risks: the patent application is rejected	Moderate	3	Moderate	3	9	Moderate	Take steps to provide the missing data	5
5	Management and Financial								
5,1	Nobody buys: Our licensee is not exploiting his exclusive license	Moderate	3	Major	4	12	High	Securing the manufacturing process.	7
5,2	Know- how risks: there are leaks of confidential information	Moderate	3	Major	4	12	High	Securing the manufacturing process.	7
5,3	Multiple change to original objectives	Moderate	3	Moderate	3	9	Moderate	Clear communication between partners, discuss objectives during the semi-annual meetings	8
5,4	Lack of awareness of risk management	Unlikely	2	Moderate	3	6	Moderate	Perform individual risk assessments regarding this project	7
5,5	Inadequate communication among partners	Moderate	3	Moderate	3	9	Moderate	Set communication goals, update contact lists regularly	7
5,6	Inadequate reporting procedures	Unlikely	2	Moderate	3	6	Moderate	Set reporting goals, discuss during meetings	8
5,7	Off time supply of financial means	Unlikely	2	Moderate	3	6	Moderate	Plan ahead, slow down expansion process	8
5,8	Weak exploitation. Inadequate business plan	Moderate	3	Moderate	3	9	Moderate	Communication with future customers about their expectations	8
6	Environmental, Regulation, Safety and Other Risks								
6,1	Nobody buys the product. Does not comply with the standards	Moderate	3	Major	4	12	High	Contact standards experts. Consider alternative solutions (e.g. “non-load bearing elements”)	5
6,2	Nobody buys: Standards to make it compulsory don’t yet exist	Moderate	3	Major	4	12	High	Prepare a submission for the standards committee	2
6,3	Research is socially or ethically unacceptable	Rare	1	Major	4	4	Low	Communication with future customers about their expectations	7
6,4	Influence of laws and regulations	Unlikely	2	Moderate	3	6	Moderate	Join industry groups with close ties to policy makers	8

The following table reflects the findings from the previous table.

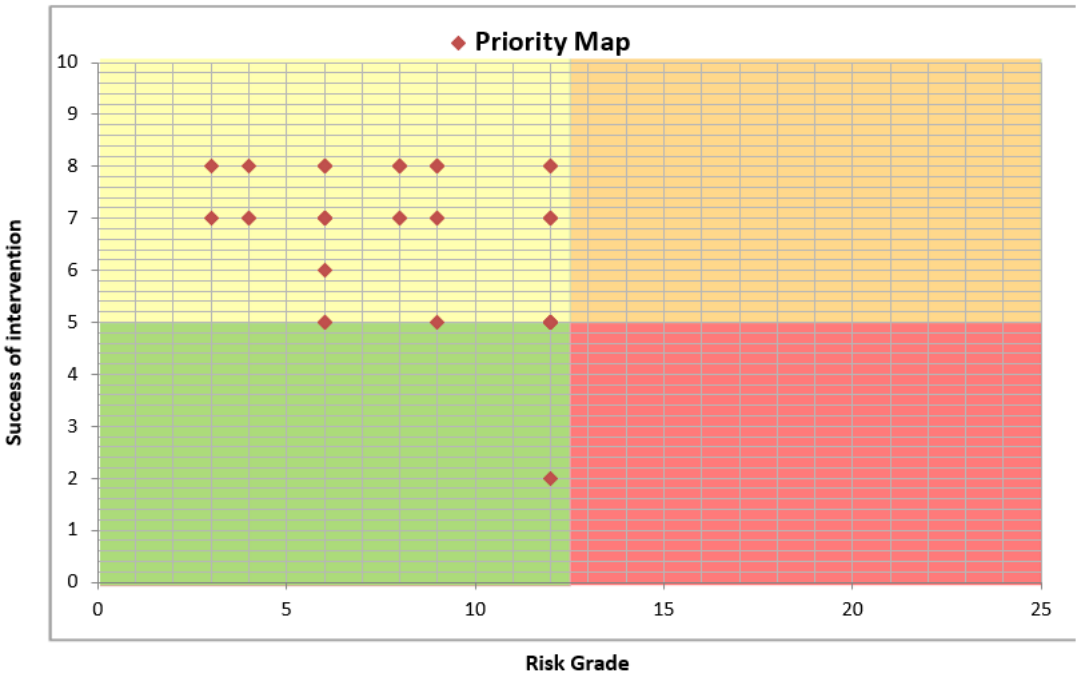

Figure 2: Priority map of EENSULATE project

So far, no results within the category “action” or “waring” have been identified. However, 12 risks were evaluated as of high importance and should be adequately monitored by both the project coordinator and exploitation leaders. The category of market risks was highlighted during the risk assessment exercise. Thus, the consortium should bear in mind that market assessment, business models, plans and strategies must take into account also non-financial benefits as the cost of some results is expected to be slightly higher than its competition. Simultaneously, standardization is a crucial activity of the EENSUALTE project and should be treated as such in order to prevent legal issues and the fact that the product cannot be sold if lacking certification.

7 Preliminary individual exploitation plans

The EENSUALTE project consortium is composed of industrial actors, academic partners and research organizations, as well as municipality and architects' studio who represent end-users' perspective. The exploitation strategy thus must ensure that all involved parties' interests are taken into account in the exploitation activities. Consequently, the foreground resulting from the EENSULATE project will be subjected to two types of exploitation - industrial exploitation and academic exploitation. While industrial exploitation generally deals with the direct or indirect utilization of the developed foreground for commercial purposes, academic exploitation deals with results utilization in further research activities other than those covered by the project. The following sub-chapters describe how these two kinds of exploitation will be treated within the EENSUALTE project.

7.1 Industrial exploitation

The EENSUALTE project is expected to bring an advancement and competitive advantage to industrial partners in various industrial areas. For this reason, industrial partners' interest is mainly in commercial exploitation. The desire for successful commercial exploitation is stressed by the participation of the most qualified industrial actors in the EENSUALTE project. Simultaneously, all project partners committed to fulfil the responsibilities necessary for the research and development. In this manner, the consortium has been chosen to represent the entire value chain in order to meet the objectives of the project. Consequently, the research and development activities of EENSUALTE results are covered almost entirely by project partners – from material and component supplies, to design guidelines, production and demonstration. The consortium not only forms an entire value chain but also a complete supply chain. The value and supply chain are as follows:

- The Vacuum Insulated Glass supplied by AGC and TVITEC
- Thermo-tunable coating developed by UCL
- Mono-component and bi-component foam for various application including windows application is being developed by SELENA with help of EVONIK, ULSTER, FOCCHI, and BGTECH
- Innovative sealant and getter for vacuum insulated glass that are being developed by SAES with help of RINA, TVITEC, ULSTER and FOCCHI
- Testing protocols for durability assessment of glazed surfaces created by UNIVPM with involvement of UCL, ULSTER
- Window framing solution compatible with EENSULATE glass that is being developed by BGTECH with help of FOCHI, AGC, TVITEC, SAES,
- Design manufacture and installation of high-insulation façade created by FOCCHI with help of RINA C, AGC, SAES, SELENA, UCL, EVONIK, ULSTER, TVITEC, UNSTUDIO, UNIVPM

7.2 Academic exploitation

Academic partners and research organizations are hardly ever interested in commercial exploitation. However, as they contribute to exploitable results by proving their knowledge, they must be taken into consideration in exploitation activities too. Interests of these types of partners are mostly in gaining a know-how knowledge. Within the EENSUALTE project, these partners are ULSTER, UNIVPM, and UCL. The know-how that they are acquiring during this project will be used mostly for academic interests or for

further research activities other than those covered by the project. The main interests of academic partners are often the further development of specific research topics, the participation and/or organization of seminars, event sand courses as well as, in the case of universities, new bachelor, master and PhD thesis development. In addition, newly gained knowledge might prove important in other researches and projects or even in enhancing products for the market uptake.

7.3 Partners' individual exploitation plans

The preliminary analysis of each partner has been carried out to provide a short description of the partners and their interest, as well as the opportunities they foresee in exploiting results they are involved in and/or responsible for within the EENSULATE project. The following paragraphs aim to describe each partner's role in the project and their expectations resulting from the project. As the project is currently in its early stages, some details are falling short. The plans will be continuously updated to ensure that the widest communication and dissemination of the results generated by the project can be achieved and the results can be adequately protected and exploited.

7.3.1 RINA-C

Description of project partner:

RINA CONSULTING S.p.A. (former D'Appolonia S.p.A) belongs to the RINA Group and is the largest fully independent Italian firm providing consulting and engineering services to clients belonging to the public and the private sector. The company operates in the markets of energy, transport and infrastructures, industry and investor support. The company provides a wide range of services covering the whole project life cycle from feasibility and specialized technical studies to conceptual and detailed design, prototyping and testing, project management, site engineering as well as operation and maintenance management.

Role in the project:

RINA-C is the coordinator of EENSULATE project and is responsible for the development of the technical requirements, performance specifications as well as modelling and conceptual design of the EENSULATE façade module. RINA-C is also responsible for the assessment of the environmental effectiveness and sustainability of the EENSULATE solutions through LCA approach (Task 5.3) and development of an appropriate IPR strategy of the project results in order to enable their full exploitation into the market (Task 6.2). RINA-C is a leader of:

- WP1: Business drivers and high-level performance specifications.
- T1.1: Regulatory requirements, certification and procurement practices
- T1.3: Performance driven concept design and value engineering
- T6.2: IPR management and standardization
- WP7 and T7.1: Management

Expectations:

Rina will transfer the knowledge generated during the project, in particular – knowledge and know-how revolving around the design of the façade, to its façade engineers. Rina will further organize internal dedicated training courses in order to utilize the gained knowledge from the demo-site installation and application. Rina is expected to acquire knowledge generated throughout the project, in order to provide consultancy activity and to adequately address the main segments of the relevant markets, such as curtain-walls market, retrofitting markets and new-construction market.

7.3.2 AGC Glass Europe SA

Description of project partner:

AGC Glass Europe SA is the European branch of AGC (Asahi – Japan) and one of Europe's largest producers of flat glass for the building industry and the automotive industry. The building division focuses on float, on and off line coated glass, laminated, tempered, mirrors, etched glass, painted glass, architectural glass, industrial glass for fire resistant applications and for electronics. The product range in the automotive field covers, tempered, laminated including windshields for head up displays and active glazing such as switching sun roofs. AGC Glass Europe has an innovation Center, based in the air-pole of Gosselies (Belgium). It hosts around 240 people from the Engineering, IP and R&D teams. R&D and Engineering work in close collaboration with all the European plants, not only for the implementation of new developments but also for technical assistance and scientific guidance. Among the involved production entities, the Interpane plants in Germany are specialised in the production of insulating glazing units.

Role in the project:

AGC will bring its industrial experience into the project addressing the following issues:

- Development of a lightweight and highly insulating large surface area component for transparent envelope enabling
- an affordable retrofitting of glazed envelopes of the millions of public and commercial buildings in Europe;
- Breakthrough sealing and getter technology to manufacture durable (20 years +) VIG over large surface areas;
- Thermotunable coating for dynamic solar control

Expectations:

AGC is expected to sell the newly modelled glass with the thermotunable coating. This EENSULATE glass creates a new level in their field, and this innovative technological advancement is expected to push AGC to constitute a state of competitive advantage over other competitors in the market, and expend the existing gap between AGC and other companies in Europe. The strive to improvement brought with the development of the EENSULATE glass is expected to allow AGC to offer the most advanced and progress material in the market. The considerable market potential of the EENSULATE glass is expected to be at least 1-2 million m^2. By the end of the project, AGC is expected to evaluate the business opportunities for investing in thermotunable coating in order to meet the demand of assembled glazing units.

7.3.3 SAES GETTER S.P.A.

Description of project partner:

SAES GETTERS S.p.A. is a part of SAES Group which develops and produces components and systems based on active advanced materials for many industrial and scientific applications. SAES has almost 70 years of experience in Vacuum Science & Technology applied in many sectors and applications including Vacuum Insulated Devices. The company focuses on maintaining the proper vacuum in vacuum insulated panels (VIP) and vacuum insulated glass/glazing (VIG) by capturing gases and vapors by means of getters. SAES has developed technical solutions to prevent moisture and gases penetration through non-hermetic sealing by incorporating suitable gas scavengers inside adhesives and edge sealants for glass, metals and flexible substrates. This is obtained through SAES's technology platform named FPC (Functional Polymer Composites). SAES has also several characterization techniques to test materials and final sealed devices.

Role in the project:

SAES is responsible for the development of the sealing and distributed gettering technology to enable the low temperature manufacturing of EENSULATE Vacuum Glazing (WP3). SAES will develop an innovative low-temperature (<200 °C) sealing for the EENSULATE glass in combination with an innovative getter that together will synergistically guarantee the required target of vacuum and lifetime.

SAES is a leader of:

- WP3: Optimization and scale up to the innovative high insulating and dynamic vision glass component – EENSULATE glass
- T ask 3.2: Innovative sealing development
- T ask 3.3: Innovative getter development

Expectations:

SAES is expecting to become a solution-provider in the area of manufacturing getter and sealant used in the EENSULATE glass façade. These products, once entering the market, may be utilized in additional applications such as hermetic sealing of different products such as evacuated solar-thermal collectors.

7.3.4 SELENA LABS SPOLKA Z ORGANICZONA ODPOWIEDZIALNOSCIA

Description of project partner:

SELENA LABS Sp. Z.o.o. co-ordinates research and development activity for Selena Group's production plants in Poland, China, Spain and Turkey. Selena focuses mainly on the implementation of new and innovative products that varies in four main categories:

- Polyurethane foam for sealings.
- Adhesives (PU, PVA, solvent based, water based, Hybrid PU-Sil)
- Sealants (Silicone, hybrid, acrylic, pu)
- Hydro insulation (Bitumen based)

Selena's experts also help to set up production plants across the world in order to monitor implementation of the technologies and solutions developed in its laboratories.

Role in the project:

Selena is responsible for supplying an innovative foam to increase performance in overall insulation, looking to a new idea that can drive innovation through the building material sector. Selena competence in formulating polyurethane foams will be of fundamental importance for coordinating different task in the project. In EENSULATE project, Selena will be responsible for the optimization and scale up of the EENSULATE foam, an innovative high insulating material for the spandrel and installation process (WP2). Selena prepolymers and polyol blends will be key stone for WP2 to realize the product desired for the project.

Selena is a leader of:

- WP2: Optimization and scale up to the innovative high insulating material for the spandrel and installation process – EENSULATE foam
- T ask 2.1.: Synthesis of smart fillers
- T ask 2.3: OCF formulation production
- T ask 2.4: EENSULATE Foam material characterisation and durability assessment

Expectations:

Selena will create designated foam to be utilized in the creation of glass façade with increased insulation. Selena will take a heavy investment program in order to accelerate industrialization of the novel foam. Selena produces 2 types of insulating foams for various applications and broader market segments.

7.3.5 UNIVERSITY OF ULSTER

Description of project partner:

The Centre for Sustainable Technologies (CST) at Ulster University, undertakes research in areas such as architecture, building energy efficiency, clean combustion, sustainability and renewable energy. CST energy research is currently focused on: advanced glazing systems, solar thermal technologies, retrofit for building energy efficiency, low carbon and passive construction, heat pumps, energy storage, computer modelling, and the development of biomass and bio energy systems including gasification and bio-oil concepts.

The group has extensive computer simulation and modelling experience in the thermal performance on advanced glazing and building components and has worked with industrial collaborators on the development of glazing systems and techniques for improving energy efficiency in historical building applications.

FireSERT is the Institute for Fire Safety Engineering Research and Technology within the School of Built Environment, Ulster University. FireSERT has huge competences in Fire Safety Engineering with regard to the design and construction of buildings and structures to achieve the required level of safety at best value for money.

Role in the project:

ULSTER is mainly responsible for the fabrication of the prototype samples using the innovative sealing technologies and getterings technology developed in EENSULATE project (Task 3.5). In addition, ULSTER is also involved in the following project activities:

- The characterisation of the flammability and fire resistance of the spray foam (Task T2.4)
- The analysis of the optical, thermal and mechanical properties of a range of glass types which will be used to inform the design of the VIG (Task 3.1)
- The development of the novel edge seals which are compatible with tempered glass and a wide range of low-e and dynamic coatings (Task 3.2)
- The investigation of the fire performance of the complete system in a full-scale fumace (Task 4.3)

Expectations:

UCL will assist in the scaling up of the technology, by participating in the licensing for glass manufacturers, such as AGC. The co-produced coating development will assist in the acquiring of the know-how of the thermotunable coatings, which may be applicable in other researches and promote the interest in the research on the development of the field through opening positions and call for applications on such researches. The contribution of the academic actor in the consortium seeks to invest in the long-term result of growth and expansion of the field from theoretical approaches to practical development.

7.3.6 TVITEC SYSTEM GLASS, SL

Description of project partner:

TVITEC SYSTEM GLASS, SL focuses mainly on:

- The production, processing and/or manufacture of glass in all its varieties and forms, both for industrial use and for domestic use.
- Research, development and innovation in design, process and applications of glass, as well as the different technologies and machines intended for manufacturing, processing, manufacturing and installation.
- The import, export, trading and marketing, retail and wholesale, of all kinds of materials directly or indirectly related to glass and its manufacture.

TVITEC is growing rapidly and represents a "large" SME which is chosen by the market for its highly innovative products and fast response to client needs. TVITEC is the second biggest player in the EU market after Interpane, which belongs to the AGC group.

Role in the project:

TVITEC contributes to EENSULATE project mainly in the following areas:

- Development and integration of an industrial system for manufacture large glass dimensions of Vacuum insulated glazing
- Calculation of the main technical necessities and requirements for new VIG of large dimensions
- Structural characterization of the EENSULATE glass prototypes (Task 3.6)

Expectations:

TVITEC will take part in the development of the thermotunable coating and vacuum sealing. The knowledge will serve in the implementation of the technology in the TVITEC manufacturing lines, creating the first prototype within the period of two years from the completion of the project. TVITEC will address the market together with FOCCHI and AGC.

7.3.7 FOCCHI SPA

Description of project partner:

The Focchi Group was founded in 1914 and up to the 1950s Focchi operated in the metal carpentry sector, later expanding its technology to aluminium work and, in particular, to door and window frames. It was in the 1970s that the company entered the curtain walling sector, and this has remained the company's core business ever since.

The core business of Focchi is the realization of curtain walling and envelope for architecture. The activity can be defined as design, manufacture and installation of curtain walling systems with high technological and service content, and glass curtain walling with high-energy efficiency.

Role in the project:

Focchi is a leader of:

- Task 1.5: Material/component/module eco-design flow
- WP4: Detailed design, prototyping and lab characterisation of EENSULATE façade modules
- Task 4.1: Design optimization and development of the façade module

- Task 4.2: Manufacturing of the prototype for testing in relevant environment
- Task 4.4: Testing and monitoring activities

On the top of the above, FOCCHI contributes to the following:

- Definition of the requirements for the EENSULATE system, to develop a commercial remarkable product (Task 1.1 – 1.3)
- Implementation of the retrofit process at the individual testing sites with the support of BGTEC

Expectations:

Focchi will spearheaded the design manufacture and installation of the high-quality façade, referred to as expected exploitable result number 3. Focchi will exploit the novel material and components as well as automated manufacturing lines using the foams. This progress is expected to serve as a key-drive for Focchi to get new market shares in comparison to other competitors such as Permastelisa, giving competitiveness to Focchi. The company's know-how is a result of detecting the quality of the manufactured spandrels with foams. They are furthermore expected to install a new line for the automated line, producing the spandrel using the foam.

7.3.8 Van Berkel & Bos U.N. Studio B.V.

Description of project partner:

UNStudio is a Dutch architectural design studio specializing in architecture, urban development and infrastructural projects. The name, UNStudio, stands for United Network Studio, referring to the collaborative nature of the practice. As a network practice, a highly flexible methodological approach has been developed which incorporates parametric design and collaborations with leading specialists in other disciplines. Since its inception, the office has produced a wide range of work from public buildings, infrastructure, offices, residential, products, to urban masterplans.

UNStudio has been developing design knowledge as a result of combining the designing and building of projects with an active participation in architectural theory. In 2008, following a continued interest in geometry, digital production, material effects and attainable design solutions, this communal knowledge led to the introduction of knowledge platforms to the studio. Whilst the primary objective of its project teams is to deliver the 'result' of architectural thinking (buildings, plans, designs), the objective of the knowledge platforms is to distil knowledge from within the practice of architecture in order to propel design thinking and innovation.

Role in the project:

UNStudio's experience in the global architectural design and construction industry provides an expertise in the application and coordination of innovative design that is of great value to the consortium. UNStudio will provide design guidance for the preliminary and prototypical designs of the products in the EENSULATE project. During the testing and demonstration phases UNStudio will provide coordination and advisement to manufacturing and installation partners. They will further advise and participate in exploitation and dissemination of the project.

UNStudio is a leader of Task 1.4: Façade perception and integration with building.

Expectations:

UNstudio serves on the project as architectural studio. The demands for glass façades rises despite the requirement to progress in innovative sustainable material, which usually isn't a glass. UNstudio is expecting to gain insights on how to use the new technologies, and design new building facades, making

use of the BIM libraries. The project is expected to provide the know-how on the use of these new technologies' applications.

7.3.9 FENIX TNT SRO

Description of project partner:

Fenix is a company actively involved in the development of business opportunities in the construction sector, promotion of real estate and infrastructure projects. In this framework, the company has a deep understanding of the value chains involved, business models and emerging business propositions which relates to the field of energy efficiency, retrofitting, demolition and reuse. Because of the multidisciplinary and strong cross-sectorial skills, Fenix works at the interface of industrial sectors, supplying materials and equipment. Fenix has access to a wide network of architects, designers and stakeholders in the key sectors. Fenix has internal construction and building assessment knowledge, instrumental for the drafting of techno-economic feasibility studies as well as LCA/LCC analysis, business modelling and market research across Europe with focus on material efficiency, product life extension and product recycling.

Fenix has long experience in communication activities and dissemination planning related to the construction sector. Fenix has a long experience in the preparation of dissemination and exploitation plan within the framework of research and innovation projects funded by the EC. Fenix is able to coordinate and manage communication and dissemination activities of an entire research and innovation project.

Role in the project:

Fenix will be mainly in charge of Business Planning, Commercialization and Exploitation Plans as well as communication and dissemination activities (WP6). In addition, Fenix will lead the review of market drivers for the solutions proposed by EENSULATE project (Task 1.2).

Fenix is a leader of:

- Task 1.2: Review of market drivers
- WP6: Exploitation, Dissemination and Communication
- Task 6.1: Exploitation, business modelling and business development
- Task 6.3: Communication and Dissemination
- Task 6.4: Training activities

Expectations:

Fenix is expected to improve knowledge and expertise in the fields of dissemination, exploitation and business models. The understanding of the fields, such as the curtain walls, glaze buildings, construction markets and retrofitting markets, will assist in providing information and assessments in these fields in the future. It will enlarge the Fenix portfolio of market-assessment.

7.3.10 BERGAMO TECNOLOGIE SPZOO

Description of project partner:

BGTEC is working in the window and facades market since 1996. The company headquarters are located in Konstantynow Łodzki with specific focus on the development of innovative windows and facades, integrating specialized architectural technological features. The skill and knowledge of BGTEC's technical office allow the company to objectively analyse tasks in every aspect, helping its customers choosing the right window, in terms of thermal, structural, aesthetic and, if required, acoustic aspects.

Twenty years' experience matured in the fenestration market in high end niches allowed the company to export our experience abroad, with the execution of important and high standards projects in Italy, Russia, Ukraine, Germany, Scandinavia, Middle East and Africa. BGTEC has a long-standing experience with works with historical buildings in the Lodz and Warsaw area where they were involved in 30 refurbishment projects in the last 3 years.

Role in the project:

The main role of BGTEC is the leadership of WP5: Validation of performance, sustainability and replicability, including Task 5.2: Installation of demo sites and Task 5.5: Development of installation, commissioning and maintenance guidelines.

In addition, BGTEC is involved in the following project activities:

- To contribute to the analysis of the current codes and standards regarding curtain walls design (Task 1.1)
- To contribute to the market drivers, review with the polish market assessment and nearby regional areas (Task 1.2)
- To support the development of the conceptual design of the EENSULATE solutions for historical building retrofitting work with glazing modules (Task 1.3) as well as their integration with the building structure (Task 1.4)
- To contribute to the eco-design for the assembly and disassembly of the system (Task 1.5)
- To develop design of the prototype window and solutions for historical buildings fenestration (Task 4.2)
- To design windows for the retrofitting of the historical building (Task 5.1)

Expectations:

BGTEC will exploit the thin and lightweight EENSULATE glass as well as spray-foam to introduce an innovative range of windows to the market. The assembly and selling of the window is expected to take place through the BGTEC, after receiving the ingredients (glass, foam, frame and other components) from the partners in the consortium. BGTEC is expecting to launch a new product line as well as installing curtain-walls.

7.3.11 UNIVERSITA POLITECNICA DELLE MARCHE

Description of project partner:

Università Politecnica delle Marche includes 5 Faculties: Engineering, Medicine and Surgery, Economy, Science and Agriculture. The Department of Industrial Engineering and Mathematical Sciences (DIISM) is active in the following research fields: fluid dynamics, fluid machines, systems for the energy and the environment, industrial and environmental engineering physics, mechanical and thermal measurements, applied mechanics, mechanical design and production, design and methods in industrial engineering, technology and processing techniques, industrial systems, metallurgy, and those fundamental subjects as geometry, calculus and Mathematical physics. Results obtained in, so many different research fields are the outcomes of national and international projects DIISM joined as either proposer or scientific consultant.

Main areas of research are connected with development and application of new sensors and experimental techniques for material characterization, structural and environmental monitoring, non-destructive testing and embedded systems. Main fields of application of interest for the project are: building and construction materials monitoring, quality control of construction processes. These features make this group highly

suited for the work that has to be carried out. The University laboratory equipment will be employed in the project, including the numerous available sensors.

Role in the project:

UNIVPM activity will be focused on:

- Requirements definition (WP1)
- Definition of an adaptive framework based on sensors embedded VIG system able to monitor the stimuli-sensitive solar reflective coating properties and linked to the indoor comfort control and management system
- Establishment of natural and accelerated testing protocols for durability assessment of glazed surfaces
- Integration of the VIG embedded measurement system to the (rea/simulated) BMS of the glazed façade mock-up prototype
- Demo monitoring
- Dissemination (WP7)

UNIVPM is a leader of Task 5.4: Validation of energy performance and indoor comfort.

Expectations:

UNIVPM will develop exploitable results on the characterization and methodology of both building materials and thermotunable coating. UNVPM are expecting to apply for patenting of experimental and pre-normative activities on material-characterization and durability assessment. As partner in the developments, UNIVPM is expecting to produce licensing agreements with partners in charge of industrialization of EENSULATE technology. This know-how is expected to be used in other research and development projects.

7.3.12 EVONIK NUTRITION & CARE GMBH

Description of project partner:

EVONIK is a global leader in specialty chemicals. Main strengths of EVONIK are as follows:

- Strong integrated technology platform
- Balanced spectrum of business activities and end-markets
- Close collaboration with customers
- Market-oriented research and development.

Thanks to its business activities in the fields of consumer goods, nutrition, health, and industrial specialties, Nutrition & Care encompasses many areas of daily life. Its Comfort & Insulation Business line is not only active around the world, but also plays a leadership role. It develops customized additives for manufacturing and optimizing both rigid and flexible foams.

Role in the project:

One of EVONIK core competence is its comprehensive knowledge in the processes of interfacial chemistry with focus on modified silicones, organic oligomers, and oleo-chemical derivatives. Such additives are also used as foam stabilisers and/or cell openers for diverse polyurethane applications like one component foams (OCF). EVONIK will be responsible for the development of surfactants and dispersing aids enabling production of OCN-PU foams (Task 2.2) and will provide the additives to the respective partners and consult them correspondingly.

EVONIK is a leader of Task 2.2: Surfactant development.

Expectations:

EVONIK is involved in the production of the insulating foam, by creating silicon-based surfactants that will enhance stability and processability of the foam formulation. The know-how will be utilized in the project to enlarge the portfolio of the project. The material is expected to be applied in two different components of polyurethane foam applications. The profit in the market niche is aiming at achieving additional 20% on top of existing trade in the field.

7.3.13 GMINA MIEJSKA DZIERZONIOW

Description of project partner:

The Municipality of Dzierżoniow is a leader in their region for sustainability and energy efficiency and as such has launched a retrofitting programme highly ambitious which is at the core of their interest in the EENSULATE project. GMD covers several areas, those of particular interest for the project include:

- Spatial, land management and environmental protection
- Municipal roads, streets, bridges, squares and traffic organization
- Water supply, sewerage, disposal and waste water treatment, cleaning and sanitation, landfill and municipal waste, supply of electricity and thermal energy
- The local public transport
- The maintenance of municipal buildings and public facilities and administrative buildings

Role in the project:

GMD is the owner of the two demo buildings located in Dzierżoniów where the EENSULATE solutions will be installed and validated. They will also support with the analysis of public procurement practices to derive procurement friendly approaches for the development of the EENSULATE product family.

Expectations:

The Municipality of Dzierzoniow has an interest in demonstrating the potential of the new innovative and sustainable building technologies, to the Polish public. They will gain insights on the public procurement process. The Municipality of Dzierzoniow is expected to prepare all necessary dossiers to promote the project's efforts and results by showing the benefits of the technology.

7.3.14 UNIVERSITY COLLEGE LONDON

Description of project partner:

UCL is one of Europe's leading multi-faculty universities with global outreach. Nobel prizes have been awarded to 22 former UCL academics and graduates. UCL's engineering faculty has been ranked as 2nd in Europe in citations per paper (impact) for the period 2000 – 2010 by the Times Higher Education Supplement. UCL has been at the forefront of research in the area of thermochromic and self-cleaning films for the last 15 years. In 2009, Prof. Ivan Parkin from the Department of Chemistry assisted Pilkington glass to bring the first self-cleaning in to the market. The new cleanroom facilities within the London Centre of Nanotechnology which was founded by UCL and Imperial College will be extensively used during the EENSULATE project.

Role in the project:

UCL is a leader of Task 3.4: Novel moth-eye nanostructure for thermotunable glass coatings based on VO2 integrating anti-reflective, self-cleaning properties.

Expectations:

UCL will assist in the scaling up of the technology, by participating in the licensing for glass manufacturers, such as AGC. The co-produced coating development will assist in the acquiring of the know-how of the thermotunable coatings, which may be applicable in other researches and promote the interest in the research on the development of the field through opening positions and call for applications on such researches. The contribution of the academic actor in the consortium seeks to invest in the long-term result of growth and expansion of the field from theoretical approaches to practical development.

8 Conclusions

The aim of this deliverable was to provide first version of the Exploitation plan for EENSULATE project results. The implementation was supported by the first exploitation workshop, where modifications in the list of exploitable results were discussed, as well as characterizations of individual results were updated.

The Exploitation plan will be updated along the project development to ensure dynamic and successful exploitation of project results, avoid IPR infringement and mitigate risks that could endangered the exploitation.

Fenix will secure involvement of all project partners in exploitation activities, guide them through the process and encourage them to contribute to the exploitation.

9 Annex – Exploitation workshop report

As stipulated in the Grant Agreement of the EENSULATE project, the exploitation workshops are organized to provide the consortium with support services aiming to detect the most promising results and advising on the exploitation activities. These workshops will be organized on an annual basis and will be led by the exploitation experts from the FENIX TNT and IPR experts from RINA-C.

The first exploitation workshop took place during the first day of the M12 project meeting in Genoa, Italy (4-5 October 2017). Three hours were dedicated to the workshop and following topics were discussed:

- Exploitation terminology
- Identification of the ERs
- Characterization of the ERs including TRL and BFMULO analysis
- IPR related issues
- Risk assessment
- Preliminary market assessment

FENIX TNT as an exploitation leader (represented by Barbora Blaskovicova and Robbert Kluwer) and RINA as IPR specialist (represented by Francesca Marchi and Francesca Zappia) led the workshop and all consortium partners were involved in the discussions. The purpose of the exploitation workshop was twofold: first, to introduce the exploitation and exploitation suggestions to the partners; and second, to collect data needed for the drafting of the Exploitation Plan.

The outcomes, discussed changes and conclusions of this workshop will be implemented in the two deliverables – *Initial Exploitation Plan* (D6.4) and *IPR manual* (D6.5) due in M18.

The initial step for organizing the exploitation workshop is to identify ERs. Approximately a month before the workshop, all consortium partners were asked to update, add or delete, ERs identified at the proposal stage of the project. Simultaneously, partners received templates aiming to collect requested data (exploitation claims, TRL development, and risk assessment). Last, partners responsible for ERs were asked to answer questions helping to precisely characterize the results.

The exploitation workshop lasted approximately two hours. After a short introduction of the workshop objectives, the terms exploitation, exploitation strategy, and exploitation plan were defined from the theoretical point of view. It was done to ensure the common understanding of these terms as they are crucial part of the workshop. The workshop proceeded with the presentation of previously identified ERs and their characterization including the BFMULO analysis and TRL expected development. The IPR related issues were presented next. The presentation prepared by the IPR specialist from RINA included the introduction of forms of IP protection and general introduction of the topic. Furthermore, the risk assessment and the priority map were discussed with presented consortium partners. The last part of the workshop was dedicated to the preliminary version of the market assessment.

All consortium partners were involved in the workshop both by providing information and by contributing to the discussion. Participants were encouraged by the exploitation leader (FENIX TNT) and by IPR leader (RINA-C) to ask questions, add comments and discuss relevant points to the exploitation.

Workshop content:
The exploitation workshop begun with the thorough description of what exploitation stands for and what are the actions expected from the partners after the EENSULATE project ends. It was highlighted that the

leaders of the ERs are obliged to exploit their results within the period up to 4 years after the project ends. The means of exploitation were also shown and explained.

At the beginning of the ERs presentation, an update was done. One ER was removed (lightweight thin double pane vacuum glass), and one (EENSULATE mono-components foam for windows application) added.

One of the goals of the workshop was characterizing the ERs and to update both TRL development and BFMULO matrix. All partners responsible for ERs described their results and then FENIX proceeded with the TRL and BFMULO updates. Partners were asked about their exploitation claims and expectations as well as they were asked to estimate the TRL development of their results.

During the Exploitation Workshop, a slot of time was dedicated to the IPR principles explanation. RINA-C as IPR manager provided an overview of the general concepts associated to the Intellectual Property Rights (IPRs), underlining the importance of IPR Management before (during the proposal stage), during and after the Collaborative Project. Then IPR Protection Methods were listed and briefly presented highlighting the main features, pros and cons of each one and the differences one to each other. Mainly the formal methods were described, namely:

- Patents
- Trademarks
- Industrial Design
- Copyrights
- Utility Model

Partners were then invited to contact RINA-C in case of any doubts related to how to protect the IP generated within the EENSULATE project, with particular focus on the Exploitable Result each one is responsible for. RINA-C also prepared a draft version of the IP Manual providing more details on IPR, the defined procedure for its management and the full description of the IP protection methods. The IP Manual has been distributed among partners via mail immediately after the meeting for a preliminary feedback from the consortium. Final version will be submitted at the end of January 2018, with the evaluation of the potential proper measures of protection for each ER to be discussed with the related partner responsible. Moreover, the following aspects will be included:

- Collection of standards on prefabricated panels, mainly focused on Italy and Poland
- Analysis of background and foreground, exploitation claims and IP overlapping, in close collaboration with T6.1.

Four most relevant markets were identified – flat glass market, curtain wall market, insulation foam market, and European retrofit market. After describing the trends on said markets, the SWOT analysis of the EENSULATE project was presented as follows.

Strengths	Weaknesses
• Significant cost reduction • Experience of consortium • Two types of modules to fit more customers • Green image • Easy build solution integrated in the panels	• The initial investment might be costly • Little product awareness
Opportunities	**Threats**
• Little/none competition of the same product • Need for retrofit in older buildings • Increasing awareness of the benefits of glass curtain walls • Market is increasingly growing	• Lots of competition of substitute products • Design and esthetics are subjective to taste • High levels of development in the market

The last part of the workshop was devoted to presentation of Risk Assessment results and Priority Map generated based on the risk evaluation. As partners were asked to provide inputs for the assessment before the workshop, this section was dedicated to presenting and discussing the inputs. The risk assessment presentation started with the introduction of the function and purpose of the Risk Assessment. It was highlighted that early identification of risks, assessment of their likelihood of occurrence, estimation of potential impact on the project and drafting mitigation actions allows for effective overall management in general, and smooth exploitation in particular.

For tracking the risks associated to the exploitation of ERs, FENIX developed Risk Register table tool. As the project evolves, a dedicated Risk Register table will be developed for each of the exploitable results and they will be updated regularly by all project partners. The Priority Map for each ER will be created as a results of Risk Register table assessment. The Priority Map matrix serves as a tool helping to prioritize the risks. For the purposes of explaining the methodology, only one ER (ER1 – Highly insulating environmentally friendly foam) was chosen to be presented. No one risk was categorized as of high priority; however, it might change during the project development.